DECLARATION

I, Machiko Shoji, a staff member of TAIYO, NAKAJIMA & KATO, 3-17, Shinjuku 4-chome, Shinjuku-ku, Tokyo 160-0022, Japan, do hereby declare that I am well acquainted with the English and Japanese languages and I hereby certify that, to the best of my knowledge and belief, the following is a true and correct translation made by me into the English language of the documents in respect of Japanese Patent Application No. 2002-354749, that was filed on 6th December 2002 in the name of FUJI PHOTO FILM CO., LTD.

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[DOCUMENT NAME] CLAIMS

[Claim 1] A thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image, and a host device for holding the plurality of thin display devices such that pages of the thin display devices are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein:

the host device includes

an adding means for adding, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held as a plurality of pages and page position information expressing a current page position of the image data by updating each page, and

a transmission means for transmitting the image data, to which the page information and the page position information have been added by the adding means to the thin display devices; and

each of the thin display device includes

a receiving means for receiving the image data to which the page information and the page position information have been added,

a decision means for comparing the page information and the page position information of the image data received by the receiving means with each other to decide whether or not the page information and the page position information coincide with each other,

a control means for controlling the display of the display means based on a decision result of the decision means,

an updating means for updating the page position information after the decision by the decision means, and

a sending means for sending the image data, to which the page information and the page position information updated by the updating means have been added, to the thin display device of the subsequent page or the host device.

[Claim 2] A thin display file according to claim 1, wherein the host device further includes an accumulation means for accumulating image data expressing images to be displayed on the thin display devices, and an input means for selecting the image data accumulated in the accumulation means and inputting display designations including the page information.

[Claim 3] A thin display file according to claim 1 or 2, wherein the thin display devices have the display means on front and rear surfaces thereof, the adding means further adds, to the image data, front/rear information expressing the front and rear of a thin display device which is to display an image, and the control means controls display on the display means on the front and rear surfaces of the thin display device based on the decision result of the decision means and the front/rear information.

[Claim 4] A thin display file according to any one of claims 1 to 3, wherein in the series connection, connection sections through which the pages are electrically connected when the plurality of pages of the thin display devices are stacked on each other are arranged on the front surfaces and rear surfaces of the thin display devices, and host connection sections are arranged at positions at the host device corresponding to the connection sections and are connected to the connection sections.

[Claim 5] A data communication method for a thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image and a host device for holding a plurality of pages of the thin display devices such that the pages are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein:

the host device adds, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held in the host device and page position information expressing a current page position of the image data by updating each page and sequentially transmits the image data to the respective thin display devices held in the host device; and

the respective thin display devices of the plurality of pages held in the host device receive the image data to which the page information and the page position information have been added, display images on the display means based on the image data in which the page information and the page position information of the image data coincide with each other, update the page position information, and sequentially transmit image data in which the page position information is updated to the thin display devices of the subsequent pages or the host device.

[Claim 6] A data communication method according to claim 5, wherein, when the thin display devices have the display means on front and rear surfaces thereof, the host device further adds, to the image data, front/rear information expressing the front and rear of a thin display device which is to display an image, in addition to the page information and the page position information, and each thin display device displays

images on the display means on the front and rear surfaces based on the image data in which the page information and the page position information coincide with each other and the front/rear information.

[Claim 7] A thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image, and a host device for holding the plurality of thin display devices such that pages of the thin display devices are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein:

the host device includes

an adding means for adding, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held as a plurality of pages, and

a transmission means for transmitting the image data, to which the page information has been added by the adding means, to the thin display devices; and

each of the thin display devices includes

a receiving means for receiving the image data to which the page information has been added,

a decision means for comparing the page information of the image data received by the receiving means and page setting information preset for each thin display device depending on the series connections between the thin display devices with each other to decide whether or not the page information and the page setting information coincide with each other,

a control means for controlling the display of the display means based on a decision result of the decision means, and

a sending means for sending the image data, to which the page information has been added, to the thin display device of the subsequent page or the host device.

[Claim 8] A data communication method for a thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image, and a host device for holding a plurality of pages of the thin display devices such that the pages are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein:

the host device adds, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held in the host device and sequentially transmits the image data to the respective thin display devices held in the host device; and

the respective thin display devices of the plurality of pages held in the host device receive the image data to which the page information has been added, display images on the display means based on image data in which the page information of the image data and page setting information preset for each thin display device depending on a series connection between the thin display devices coincide with each other, and sequentially transmit the image data, to which the page information has been added, to the thin display device of the subsequent page or the host device.

[DOCUMENT NAME] SPECIFICATION

[TITLE OF THE INVENTION] THIN DISPLAY FILE AND DATA COMMUNICATION METHOD FOR THIN DISPLAY FILE

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a thin display file and a data communication method for a thin display file and, more particularly, to a thin display file using a plurality of stacked thin display devices and a data communication method for the thin display file.

[0002]

[Prior Art]

In recent years, with the development of information-oriented society, as a thin display device, so-called electronic paper that has both the advantages of electronic display and paper attracts attention.

[0003]

It is considered that a thin display device is used like sheets of paper such that a plurality of thin display devices are staked on each other. Therefore, for example, Patent Document 1 proposes that connection terminals having physical or electrical connection functions are arranged on sheets of electronic paper and main bodies, and the thin display devices are bundled in a file form. Patent Document 1 discloses that the electronic paper can be detachably loaded on the main body, display data is recorded in

a nonvolatile memory arranged in a display section of the electronic paper, so that the electronic paper unloaded from the main body holds the display contents. Patent Document 1 further discloses that the display contents can be held with the desired page opened.

[0004]

In this manner, thin displays can be handled as a file like sheets of paper, and the reading properties of sheets of paper can be achieved.

[0005]

[Patent Document 1]

Japanese Patent Application Laid-Open (JP-A) No. 2001-312227 (see page 1, Fig. 1)

[0006]

[Problems to be Solved by the Invention]

However, as disclosed in Patent Document 1, when a plurality of thin display devices are connected to host apparatuses (in Patent Document 1, main bodies), conventionally, in order to identify the plurality of thin display devices, the host apparatuses must be connected to the thin display devices in one-to-one correspondence. Since connection connectors or the like are arranged on the respective thin display devices, when a large number of thin display devices are stacked on each other and used, a problem is caused in that the positional relationships, e.g., vertical positions, of the plurality of thin display devices are cumbersomely identified.

[0007]

Further, a problem is caused in that the number of connection positions is increased by stacking a plurality of thin display devices on each other, so that the costs increase.

[0008]

In view of the aforementioned facts, it is an object of the invention to provide a thin display file which can perform display control with a simple structure and simple communication and a data communication method for the thin display file.

[0009]

[Means for Solving the Problems]

In order to achieve the above objects, the invention of claim 1 is a thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image, and a host device for holding the plurality of thin display devices such that pages of the thin display devices are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein the host device includes an adding means for adding, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held as a plurality of pages and page position information expressing a current page position of the image data by updating each page, and a transmission means for transmitting the image data, to which the page information and the page position information have been added by the adding means to the thin display devices, and each of the thin display device includes a receiving means for receiving the image data to which the page information and the page position

information have been added, a decision means for comparing the page information and the page position information of the image data received by the receiving means with each other to decide whether or not the page information and the page position information coincide with each other, a control means for controlling the display of the display means based on a decision result of the decision means, an updating means for updating the page position information after the decision by the decision means, and a sending means for sending the image data, to which the page information and the page position information updated by the updating means have been added, to the thin display device of the subsequent page or the host device.

[0010]

In accordance with the invention of claim 1, thin display devices are stacked as, e.g., a plurality of pages, being connected in series with each other, and held by the host device to constitute a thin display file, and image data for displaying images on the thin display devices are sequentially transmitted by the host device.

[0011]

In the host device, page information expressing a page to be displayed in thin display devices held as a plurality of pages and page position information expressing a current page position of image data by updating each page are added to image data, and transmitted to the thin display devices by the transmission means.

[0012]

In the thin display device, the receiving means receives image data added with page information and page position information. The decision means decides

whether or not the page information and the page position information coincide with each other, and the control means controls display on the display means based on the decision result.

[0013]

After the decision by the decision means, the page position information is updated by the updating means, and the image data added with the page position information and the page information is sent by the sending means to the thin display device of the subsequent pages or the host device.

[0014]

In other words, each time image data is sequentially sent from the thin display devices, the page position information is updated by the thin display devices of the respective pages. Therefore, the thin display device of the page on which the page information and the page position information coincide with each other corresponds to a page on which an image should be displayed. Accordingly, a desired image can be displayed on the thin display device of a desired page.

[0015]

In this manner, page information and page position information are added to image data transmitted from the host device, and page position information of each page is updated. In this state, when only display based on the image data is performed on a thin display device on which the page information and the page position information coincide with each other, display of the thin display file on each thin

display device can be easily controlled. Therefore, display control can be performed with a simple structure and simple communication.

[0016]

Further, in accordance with the invention of claim 2, the host device includes an accumulation means and an input means. Accordingly, a desired image can be displayed on the plurality of thin display devices held on the host device.

[0017]

In the invention of claim 3 according to claim 1 or 2, the thin display devices have the display means on front and rear surfaces thereof, the adding means further adds, to the image data, front/rear information expressing the front and rear of a thin display device which is to display an image, and the control means controls display on the display means on the front and rear surfaces of the thin display device based on the decision result of the decision means and the front/rear information.

[0018]

In the invention of claim 3 according to the invention of claim 1 or 2, when the thin display devices have the display means on front and rear surfaces thereof, the adding means of the host device further adds, to the image data, front/rear information expressing the front and rear of a thin display device which is to display an image, in addition to the page information and the page position information, and the control means controls display on the display means on the front and rear surfaces of the thin display device based on the decision result of the decision means and the front/rear information. Accordingly, even in the thin display device having the display means on

its front and rear surfaces, as described above, a desired image can be displayed on the thin display device of a desired page.

[0019]

Further, in the series connection between the plurality of thin display devices and the host device, as in the invention of claim 4, connection sections through which the respective pages are electrically connected when the plurality of pages are stacked on each other are arranged on the front surfaces and rear surfaces of the thin display devices, and host connection sections are arranged at positions at the host device corresponding to the connection sections to make it possible to electrically connect the thin display devices and the host device to each other.

[0020]

The invention of claim 5 is a data communication method for a thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image and a host device for holding a plurality of pages of the thin display devices such that the pages are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein the host device adds, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held in the host device and page position information expressing a current page position of the image data by updating each page and sequentially transmits the image data to the respective thin display devices held in the host device, and the respective thin display devices of the plurality of pages held in the host device receive the image data to which the page information and the page position information have been added, display

images on the display means based on the image data in which the page information and the page position information of the image data coincide with each other, update the page position information, and sequentially transmit image data in which the page position information is updated to the thin display devices of the subsequent pages or the host device.

[0021]

In accordance with the invention of claim 5, page information expressing a page to be displayed in the plurality of thin display devices held in the host device and page information expressing a current page position of image data by updating each page are added to the image data by the host device, and the image data is sequentially transmitted to the respective thin display devices held in the host device.

[0022]

Then, the respective thin display devices held as the plurality of pages in the host device receive the image data added with the page information and the page position information and display images on the display means based on the image data in which the page information and the page position information coincide with each other.

[0023]

Further, the respective thin display devices update the page position information and sequentially transmit the image data added with the page information and the updated page position information to the thin display devices of the subsequent pages or the host device.

[0024]

In other words, each time image data is sequentially sent from the thin display devices, page position information is updated by the thin display device of each page, the thin display device of a page on which page information and page position information coincide with each other corresponds to a page on which an image should be displayed. Therefore, a desired image can be displayed on the thin display device of a desired page.

[0025]

In this manner, page information and page position information are added to image data transmitted by the host device, and the page position information is updated on each page. Therefore, only by performing display based on the image data in a thin display device in which the page information and the page position information coincide with each other, display of a thin display file on each thin display device can be easily controlled. Accordingly, display control can be performed with a simple structure and simple communication.

[0026]

In the invention of claim 6 according to claim 5 of the invention, when the thin display devices have the display means on front and rear surfaces thereof, the host device further adds, to the image data, front/rear information expressing the front and rear of a thin display device which is to display an image, in addition to the page information and the page position information, and each thin display device displays images on the display means on the front and rear surfaces based on the image data in

which the page information and the page position information coincide with each other and the front/rear information.

[0027]

In the invention of claim 6 according to claim 5 of the invention, when the thin display devices have the display means on front and rear surfaces thereof, the host device further adds, to the image data, front/rear information expressing the front and rear of a thin display device which is to display an image, in addition to the page information and the page position information, and each thin display device displays images on the display means on the front and rear surfaces based on the image data in which the page information and the page position information coincide with each other and the front/rear information. Accordingly, even in the thin display device having display means on its front and rear surfaces, as described above, a desired image can be displayed on the thin display device of a desired page.

[0028]

The invention of claim 7 is a thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image, and a host device for holding the plurality of thin display devices such that pages of the thin display devices are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein the host device includes an adding means for adding, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held as a plurality of pages, and a transmission means for transmitting the image data, to which the page information has been added by the adding means, to the

thin display devices, and each of the thin display devices includes a receiving means for receiving the image data to which the page information has been added, a decision means for comparing the page information of the image data received by the receiving means and page setting information preset for each thin display device depending on the series connections between the thin display devices with each other to decide whether or not the page information and the page setting information coincide with each other, a control means for controlling the display of the display means based on a decision result of the decision means, and a sending means for sending the image data, to which the page information has been added, to the thin display device of the subsequent page or the host device.

[0029]

In accordance with the invention of claim 7, the plurality of display devices are stacked on each other, for example, as a plurality of pages, by being connected in series with each other, and held by the host device to constitute a thin display file, and image data for displaying images on the thin display devices are sequentially transmitted from the host device.

[0030]

In the host device, page information expressing a page to be displayed in the plurality of thin display devices held as a plurality of pages is added to image data, and the image data is transmitted to the thin display devices by the transmission means.

[0031]

In the thin display device, the receiving means receives image data added with page information. The decision means decides whether or not the page information and the page setting information preset for each thin display device coincide with each other, and the control means controls display on the display means based on the decision result.

[0032]

Further, the sending means sends image data added with page position information to the thin display devices of the subsequent pages or the host device. The page setting information, for example, when a plurality of thin display devices are held in the host device, can set the pages of the thin display devices on the thin display devices in advance, respectively.

[0033]

In other words, in the invention of claim 1, page information and page position information are added to image data, the page position information is updated by each thin display device, and display is performed when the page information and the page position information coincide with each other. However, in the invention of claim 7, only the page information is added to the image data, and the page setting information is preset in each thin display device in place of the page position information depending on a series connection between the thin display devices, so that an image is displayed when the page information and the page setting information coincide with each other. Therefore, in the same manner as in the invention of claim 1, display of a thin display file on each thin display device can be easily controlled.

Accordingly, display control can be performed with a simple structure and simple communication.

[0034]

The invention of claim 8 is a data communication method for a thin display file including a plurality of thin display devices each having a display means for displaying an image based on image data expressing an image, and a host device for holding a plurality of pages of the thin display devices such that the pages are connected in series with each other and for sequentially transmitting the image data to the plurality of thin display devices, wherein the host device adds, to the image data, page information expressing a page to be displayed in the plurality of thin display devices held in the host device and sequentially transmits the image data to the respective thin display devices held in the host device, and the respective thin display devices of the plurality of pages held in the host device receive the image data to which the page information has been added, display images on the display means based on image data in which the page information of the image data and page setting information preset for each thin display device depending on a series connection between the thin display devices coincide with each other, and sequentially transmit the image data, to which the page information has been added, to the thin display device of the subsequent page or the host device.

[0035]

In accordance with the invention of claim 8, the host device adds page information expressing a page to be displayed in the plurality of thin display devices

held in the host device to the image data and sequentially transmits the image data to the respective thin display devices held in the host device.

[0036]

Then, the respective thin display devices held as a plurality of pages in the host device receive the image data added with the page information and display images on the display means based on the image data in which the page information of the image data and the page setting information preset depending on a series connection between the thin display devices coincide with each other. In addition, the page setting information, for example, in a state in which a plurality of thin display devices are held in the host device, can set the pages of the respective thin display devices on the thin display devices in advance.

[0037]

The respective thin display devices sequentially transmit the image data added with the page information to the thin display devices of the subsequent pages and or host device.

[0038]

In other words, in the invention of claim 5, the page information and the page position information are added to the image data, the page position information is updated by each thin display device, and an image is displayed when the page information and the page position information coincide with each other. However, in the invention of claim 8, only the page information is added to the image data, the page setting information is preset for each thin display device in place of the page position

information depending on a series connection between the thin display devices, so that an image is displayed when the page information and the page setting information coincide with each other. Therefore, in the same manner as in the invention of claim 5, since display of the thin display file on each thin display device can be easily controlled. Accordingly, display control can be performed with a simple structure and simple communication.

[0039]

[Embodiments]

An embodiment of the present invention will be described below with reference to the accompanying drawings. The embodiment of the invention is constituted such that the present invention is applied to an electronic paper file having so-called electronic paper bundled.

[First Embodiment]

Fig. 1 shows the appearance of electronic paper 10 according to a first embodiment of the invention. As the electronic paper 10 according to the embodiment, electronic paper, to which a technique such as rotation of toner, electrophoretic migration, thermal rewritable, liquid crystal, and electrochromy is applied, can be used.

[0040]

As shown in Fig. 1, the electronic paper 10 according to the first embodiment of the invention has a display region 12, so that an image 14 including a text image is displayed in the display region 12.

[0041]

The display region 12 is provided with an outer frame 16 and held by the outer frame 16. The display region 12 and the outer frame 16 consist of a flexible material, and can be handled like paper.

[0042]

The outer frame 16 has a connection section 18 for electrically connecting sheets of electronic paper 10 when the sheets of electronic paper 10 are stacked on each other to make it possible to transmit and receive image data or the like to be displayed in the display region 12 through the connection section 18.

[0043]

As shown in Fig. 2, connection sections 18 are arranged on the front and rear surfaces of the electronic paper 10. When the sheets of electronic paper 10 are stacked on each other, the connection sections 18 are electrically connected to each other. As the connection section 18, a contact type one using a contact point or a connector that is mechanically connected to another or a non-contact type one using weak electromagnetic induction or the like may be applied.

[0044]

The front and rear surfaces of the electronic paper 10 are formed into the same configuration and can be defined appropriately.

[0045]

Further, as shown in Fig. 3, the sheets of electronic paper 10 are held by a host device 20 like a binder. The host device 20 comprises a pair of connection sections 23 to be connected to connection sections 18 of the sheets of electronic paper 10. The pair of connection sections 23 are arranged at positions corresponding to the connection sections 18 of the electronic paper 10. Image data accumulated in the host device 20 is transmitted to the sheets of electronic paper 10, and the image data can be received from the sheets of electronic paper 10.

[0046]

The host device 20, as shown in Figs. 4 and 5, comprises an extendable section 20A which can be extended depending on the number of sheets of electronic paper 10 to be held. Each time the number of sheets of electronic paper 10 to be held increases, the extendable section 20A is extended. Fig. 4 shows an example in which one sheet of electronic paper 10 is held by the host device 20. Fig. 5 shows an example in which three sheets of electronic paper 10 are held in the host device 20.

[0047]

Subsequently, the electric configurations of the electronic paper 10 and the host device 20 will be described below with reference to Fig. 6.

[0048]

As shown in Fig. 6, the host device 20 comprises a control section 24, an external input section 26, an operation section 28, a storage section 30, and a communication interface (I/F) 32. The host device 20 is designed to be totally controlled by the control section 24.

[0049]

The external input section 26 is designed to input image data displayed on the electronic paper 10 from a personal computer 50 or another external device. The image data input by the external input section 26 is stored in the storage section 30.

[0050]

The image data accumulated in the storage section 30 is converted into data of a predetermined format by the control section 24 and output to the electronic paper 10 through the communication I/F 32 and the connection section 22.

[0051]

The host device 20 can perform various operations through the operation section 28. For example, in this embodiment, transmission or the like of the image data stored in the storage section 30 to the electronic paper 10 can be operated and designated by operation of the operation section 28. In addition, the operation section 28 can operate and designate re-display or the like of image data which has not been completely operated.

[0052]

On the other hand, each of the sheets of electronic paper 10 includes communication I/Fs 34 and 36, a control section 38, and a display section 40 to input image data transmitted from the communication I/F 32 of the host device 20 through the connection section 18 and the communication I/F 34.

[0053]

The image data input through the communication I/F 34 is input to the control section 38, and image data to be displayed is extracted by the control section 38 and input to the display section 40, so that an image is displayed in the display region 12 by the display section 40.

[0054]

Further, the remaining image data, from which the image data to be displayed in the display region 12 by the control section 38 is extracted, is designed to be transmitted to another sheet of electronic paper 10 or the host device 20 through the communication I/F 36 and the connection section 18.

[0055]

The control section 38 includes a nonvolatile memory to store image data to be displayed on the display section 40. The image displayed on the display section 40 can be maintained even if power (not shown) supplied from the host device 20 is blocked.

[0056]

Next, the configuration of image data transmitted from the host device 20 to the electronic paper 10 and communication of the image data will be described.

[0057]

In the control section 24 of the host device 20, image data input from an external device through the external input section 26 and accumulated in the storage

section 30 is added with additional information and output. As the additional information in this embodiment, as shown in Fig. 7, two page fields (display page field P1 and position page field P2) 44 are added to page data 42 serving as image data to output to the electronic paper 10.

[0058]

The display page field P1 expresses the number of pages of electronic paper 10 to be displayed, and the position page field P2 expresses a current page position of the electronic paper 10 and is designed to be incremented on each sheet of electronic paper 10.

[0059]

The control section 38 of the electronic paper 10 reads the two page fields 44 of the image data added with the page fields 44 as described above and compares the page fields 44 with each other. When the two page fields 44 (P1 and P2) coincide with each other, the image data is designed to be displayed in the display region 12 by the display section 40. When the two page fields 44 do not coincide with each other, the position page field P2 is incremented by one to transmit the image data to the next electronic paper 10.

[0060]

Each of the sheets of electronic paper 10, as described above, repeats the comparison of the two page fields 44 and increment of the position page field P2, so that a desired image can be displayed on the electronic paper 10 located at a corresponding page position.

For example, as shown in Fig. 8, it is assumed that image data of three pages is output from the host device 20. In this case, when image data is output from the host device 20, (1, 1) is recorded in the page fields 44 of image data to be displayed on electronic paper 10A of the first page, (2, 1) is recorded on the second page, and (3, 1) is recorded on the third page. Note that (display page field P1, position page field P2) is defined image data.

[0061]

In the electronic paper 10A of the first page, image data of the first page in which the two page fields 44 coincide with each other is displayed on the display section 40, and, as the remaining image data, the position page field P2 is incremented by one. Image data having the page fields 44 expressed by (2, 2) and image data having the page fields 44 expressed by (3, 2) are output to electronic paper 10B of the second page.

[0062]

In the electronic paper 10B of the second page, similarly, image data of the second page in which the two page fields 44 coincide with each other is displayed on the display section 40, and the position page field P2 of the remaining image data is incremented by one. Image data having the page fields 44 expressed by (3, 3) is output to electronic paper 10C of the third page.

[0063]

In the electronic paper 10C of the third page, similarly, image data of the third page in which the two page fields 44 coincide with each other is displayed on the display section 40.

[0064]

When the communication between the sheets of electronic paper is performed as described above, a desired image can be displayed on the electronic paper 10 at a desired page position.

[0065]

Subsequently, an example of processes in the communication performed on the host device 20 constituted as described above will be described below with reference to the flow chart in Fig. 9.

[0066]

In step 100, the host device 20 decides whether or not image data to be displayed on the electronic paper 10 is input. When NO is determined in step 100, the host device 20 waits until YES is determined in step 100 to shift to step 102, the image data is accumulated in the storage section 30, and the process shifts to step 104. Further, the processes in step 100 and step 102 are omitted when the image data which has been accumulated in the storage section 30 is displayed on the electronic paper 10.

[0067]

In step 104, it is decided whether or not display designation is performed. This decision is made by deciding whether or not designation of display of the image

data accumulated in the storage section 30 on the electronic paper 10 is performed through the operation section 28. Further, the display designation performed through the operation section 28, for example, includes selection, a display order, and the like of image data to be displayed of the image data accumulated in the storage section 30.

[0068]

When NO is determined in step 104, the processes are ended. When YES is determined in step 104, the process shifts to step 106, and the page fields 44 are added to the image data based on the display designation. In other words, the above-described display page field P1 and the position page field P2 are added to the image data to be displayed.

[0069]

In step 108, the image data is output to the electronic paper 10, and later-described processes on the electronic paper 10 side are performed.

[0070]

In step 110, it is decided whether or not the image data is returned from the electronic paper 10. In other words, when image data whose volume is larger than the number of sheets of electronic paper 10 held on the host device 20 is output from the host device 20, the entire amount of image data cannot be displayed on the electronic paper 10, and the remaining data is returned, and decided.

[0071]

When NO is determined in step 110, a series of processes is ended. When YES is determined in step 110, the process shifts to step 112.

[0072]

In step 112, it is decided whether or not display designation of the remaining images is performed to the operation section 28. When NO is determined, a series of processes is immediately ended. When YES is determined, the process shifts to step 114.

[0073]

In step 114, to the remaining images, i.e., image data which cannot be completely displayed and is returned from the electronic paper 10, the page fields 44 are initialized and output, and a series of processes is ended. More specifically, to the image data which cannot be completely displayed, the display page field P1, the position page field P2, and the front/rear field P3 are output from the electronic paper 10 of the first page as values to be displayed. In this manner, the remaining images can be sequentially displayed from the electronic paper 10 of the first page.

[0074]

Subsequently, the aforementioned processes in the communication performed by the electronic paper 10 will be described below with reference to the flow chart in Fig. 10.

[0075]

In the electronic paper 10, in step 200, it is decided whether or not image data is input. More specifically, it is decided whether or not image data to be displayed on the electronic paper 10 is input from the host device 20. When NO is determined, the electronic paper 10 waits until YES is determined to shift to step 202.

[0076]

In step 202, the page fields 44 of each image data are compared with each other. More specifically, the values of the display page field P1 and the position page field P2 are compared with each other.

[0077]

Next, in step 204, it is decided whether or not a comparison result between the two compared page fields of the image data satisfies a condition: display page field P1 = position page field P2. When YES is determined, the process shifts to step 206 to display an image based on the image data, i.e., display an image in the designation region 12 by the display section 40, and then, shifts to step 208.

[0078]

On the other hand, when NO is determined in step 204, the image data is not image data to be displayed on the electronic paper 10, therefore the electronic paper 10 immediately shifts to step 208.

[0079]

In step 208, the position page field P2 is incremented by one, and the process shifts to step 210 to output the image data to the next electronic paper 10 (to the host device 20 if there is no electronic paper 10).

[0080]

In step 212, it is decided whether or not comparison between the page fields 44 of all the image data input from the host device 20 is completed. When NO is determined, the process returns to step 202 to repeat the above processes. When YES is determined in step 212, a series of processes of the electronic paper 10 is ended.

[0081]

In this way, on the host device 20 side, the two page fields 44 are added to image data. On the electronic paper 10 side, a desired image can be easily displayed on the electronic paper 10 corresponding to each page by only comparing the two page fields 44 with each other and by only incrementing the position page field P2.

[0082]

Further, when the communication between the host device 20 and the electronic paper 10 is performed as described above, display control can be easily performed without detecting the number of sheets of electronic paper 10 held on the host device 20 in advance, and the number of displays can be easily recognized by the host device 20 without arranging a complex connection mechanism.

[0083]

In addition, the control section 38 of the electronic paper 10 can be simplified and increased in speed, and the costs of the electronic paper 10 can be reduced.

[Second Embodiment]

Next, an electronic paper and a host device according to the second embodiment of the present invention will be explained.

[0084]

In the electronic paper 10 according to the first embodiment, the display region 12 is formed on one side. However, in the electronic paper according to the second embodiment, display regions are formed on both sides. The other configuration is the same as that in the first embodiment. The host device in the second embodiment is the same as that in the first embodiment.

[0085]

As an electric configuration, as shown in Fig. 11, the host device 21 is the same as that in the first embodiment except for control of a control section. Electronic paper 11 has two display sections, i.e., a front display section 40A and a rear display section 40B. Since the other configuration of the electronic paper 11 is the same as that in the first embodiment, descriptions thereof will be omitted. The same reference numerals as in the first embodiment denote the same parts in Fig. 11.

[0086]

The configuration of image data transmitted from the host device 21 according to the second embodiment to the electronic paper 11 and communication of the image data will be described below.

[0087]

In a control section 25 of the host device 21, image data input from an external device through an external input section 28 and accumulated in a storage section 30 is, as shown in Fig. 12, added with additional information and output. As the additional information, in the second embodiment, two page fields (display page field P1 and position page field P2) 44 are added to page data serving as image data, and a front/rear field P3 for expressing a front or rear surface for displaying an image is added. The resultant image data is output to the electronic paper 11.

[0088]

The display page field P1 expresses the number of pages of electronic paper 11 to be displayed, and the position page field P2 expresses a current page position of the electronic paper 11 and is designed to be incremented on each sheet of electronic paper 11. In the front/rear field P3, reference numerals 1 and 2 denote front and rear surfaces, respectively. However, the invention is not limited thereto.

[0089]

The control section 38 of the electronic paper 11, in the same manner as in the first embodiment, compares the two page fields 44 of the image data added with the page field P1 as described above with each other. When the two page fields 44 coincide with each other, the image data is displayed in the display region 12 by the display

sections 40A and 40B. At this time, in the second embodiment, an image is designed to be displayed on any one of the front and rear surfaces of the electronic paper 11 based on the value of the front/rear field P3. More specifically, when the value of the front/rear field P3 is 1, the image is displayed in the front display region by the display section 40A. When the value of the front/rear field P3 is 2, the image is displayed in the rear display region by the display section 40B. In decision of the front or rear surface of electronic paper 11, for example, the control section 38 of the electronic paper 11 can decide a communication I/F 34 (connection section 18) to which image data is input as a front surface.

[0090]

Each of the sheets of electronic paper 11, as described above, repeats comparison between the two page fields 44, incrementation of the position page field P2, and checking of the front/rear field P3, so that a desired image can be displayed on the front or rear surface of the electronic paper 11 at a corresponding page position.

[0091]

For example, as shown in Fig. 13, it is assumed that image data of the front and rear surfaces of three pages is output from the host device 21. In this case, when image data is output from the host device 21, (1, 1, 1) is recorded in the page fields 44 and the front/rear field P3 of image data to be displayed on the front surface of electronic paper 11A of the first page, (1, 1, 2) is recorded in the page fields 44 and the front/rear field P3 of the image data to be displayed on the rear surface of the electronic paper 11A of the first page, and (2, 1, 1) is recorded on the front surface of the second page, (2, 1, 2) is recorded on the rear surface of the second page, (3, 1, 1) is recorded on

the front surface of the third page, and (3, 1, 2) is recorded on the rear surface of the third page. Note that (display page field P1, position page field P2, front/rear field P3) is defined image data.

[0092]

In the electronic paper 11A of the first page, in the same manner as in the first embodiment, with respect to image data of the first page in which the two page fields 44 coincide with each other, image data having 1 as the front/rear field P3 is displayed on the front surface, and image data having 2 as the front/rear field P3 is displayed on the rear surface. With respect to the remaining image data, the position page field P2 is incremented by one, image data having (2, 2, 1) and (2, 2, 2) as the page fields 44 and the front/rear field P3 and image data having (3, 2, 1) and (3, 2, 2) as the page fields 44 and the front/rear field P3 are output to electronic paper 11B of the second page.

[0093]

In the electronic paper 11B of the second page, as described above, with respect to image data of the second page in which the two page fields 44 coincide with each other, image data having 1 as the front/rear field P3 is displayed on the front surface, and image data having 2 as the front/rear field P3 is displayed on the rear surface. With respect to the remaining image data, the position page field P2 is incremented by one, image data having (3, 3, 1) and (3, 3, 2) as the page fields 44 and the front/rear field P3 are output to electronic paper 11C of the third page.

[0094]

In the electronic paper 11C of the third page, as described above, with respect to image data of the third page in which the two page fields 44 coincide with each other, image data having 1 as the front/rear field P3 is displayed on the front surface, and image data having 2 as the front/rear field P3 is displayed on the rear surface.

[0095]

The communication performed as described above can make it possible to display a desired image on the front or rear surface of the electronic paper 11 at a desired page position.

[0096]

Processes in the communication performed in the host device 21 constituted as described above will be described below with reference to the flow chart in Fig. 14.

[0097]

In the host device 21, in step 300, it is decided whether or not image data to be displayed on the electronic paper 11 is input. When NO is determined in step 300, the host device 21 waits until YES is determined in step 300 to shift to step 302, the image data is accumulated in the storage section 30, and the host device 21 shifts to step 304. The processes in step 300 and step 302 are omitted when the image data which has been accumulated in the storage section 30 is displayed on the electronic paper 11.

[0098]

In step 304, it is decided whether or not display designation is performed. This decision is performed by deciding whether or not designation of display of the

image data accumulated in the storage section 30 on the electronic paper 11 is performed through the operation section 28. The display designation performed through the operation section 28, for example, includes selection, a display order, and the like of image data to be displayed of the image data accumulated in the storage section 30.

[0099]

When NO is determined in step 304, the processes are ended. When YES is determined in step 304, the process shifts to step 306, and the page fields 44 and the front/rear field P3 are added to the image data based on the display designation. More specifically, the display page field P1 described above, the position page field P2, and the front/rear field P3 are added to the image data to be displayed.

[0100]

In step 308, the image data is output to the electronic paper 11, and later-described processes on the electronic paper 11 side are performed.

[0101]

In step 310, it is decided whether or not the image data is returned from the electronic paper 11. More specifically, when image data corresponding to the sheets of electronic paper 11 whose number is larger than the number of sheets of electronic paper 11 held on the host device 21 is output from the host device 21, the image data cannot be completely displayed on the electronic paper 11, and the remaining image data is returned.

[0102]

When NO is determined in step 310, a series of processes is ended. When YES is determined in step 310, the host device 21 shifts to step 312.

[0103]

In step 312, it is decided whether or not display designation of the remaining images is performed to the operation section 28. When NO is determined, a series of processes is immediately ended. When YES is determined, the host device 21 shifts to step 314.

[0104]

In step 314, to the remaining images, i.e., image data which cannot be completely displayed and is returned from the electronic paper 11, the page fields 44 and the front/rear field P3 are initialized and output, and a series of processes is ended. More specifically, to the image data which cannot be completely displayed, the display page field P1, the position page field P2, and the front/rear field P3 are output from the electronic paper 11 of the first page as values to be displayed. In this manner, the remaining images can be sequentially displayed from the electronic paper 11 of the first page.

[0105]

Subsequently, processes in the communication performed by the electronic paper 11 according to the second embodiment will be described below with reference to the flow chart in Fig. 15.

[0106]

In the electronic paper 11 according to the second embodiment, in step 400, it is decided whether or not image data is input. More specifically, it is decided whether or not image data to be displayed on the electronic paper 11 is input from the host device 21. When NO is determined, the electronic paper 11 waits until YES is determined in step 400 to shift to step 402.

[0107]

In step 402, the page fields 44 of each image data are compared with each other. More specifically, the values of the display page field P1 and the position page field P2 are compared with each other.

[0108]

In step 404, it is decided whether or not a comparison result between the two compared page fields of the image data satisfies a condition: display page field P1 = position page field P2. When YES is determined, the process shifts to step 406.

[0109]

In step 406, it is decided whether or not the front/rear field P3 is 1. More specifically, it is decided whether or not image data is to be displayed on the front surface of the electronic paper 11. When YES is determined in step 406, the electronic paper 11 shifts to step 408, the image is displayed on the front surface of the electronic paper 11 based on the image data, i.e., an image is displayed in the display region by the display section 40A, and the electronic paper 11 shifts to step 412.

[0110]

When NO is determined in step 406, i.e., when the image is to be displayed on the rear surface of the electronic paper 11, the electronic paper 11 shifts to step 410 to display the image on the rear surface of the electronic paper 11 based on the image data, i.e., to display the image in the display region by the display section 40B, and the electronic paper 11 shifts to step 412.

[0111]

On the other hand, when NO is determined in step 404, the image data is not image data to be displayed on the electronic paper 11, therefore the electronic paper 11 immediately shifts to step 412.

[0112]

In step 412, the position page field P2 is incremented by one, and the electronic paper 11 shifts to step 414 to output the image data to the next electronic paper 11 (to the host device 21 if there is no electronic paper 11).

[0113]

In step 416, it is decided whether or not comparison between the page fields 44 of all the image data input from the host device 21 is completed. When NO is determined, the process returns to step 402 to repeat the above processes. When YES is determined in step 416, a series of processes of the electronic paper 11 is ended.

[0114]

As described above, with respect to the electronic paper 11 having front and rear surfaces on which images can be displayed, the two page fields 44 and the front/rear field P3 are added to image data. On the electronic paper 11 side, a desired image can be easily displayed on the front or rear surface of the electronic paper 11 corresponding to each page by only comparing the two page fields 44 with each other to check the front/rear field P3 and by only incrementing the position page field P2.

[0115]

When the communication between the host device 21 and the electronic paper 11 is performed as described above, display control can be easily performed without detecting the number of sheets of electronic paper 11 held on the host device 21 in advance, and the number of displays can be easily recognized by the host device 21 without arranging a complex connection mechanism.

[0116]

In addition, the control section 38 of the electronic paper 11 can be simplified and increased in speed, and the costs of the electronic paper 11 can be reduced.

[0117]

In addition, in the second embodiment, by performing the communication between the host device 21 and the electronic paper 11 as described above, when the electronic paper 11 is held by the host device 21, appropriate display can be performed without being conscious of the front and rear surfaces of the electronic paper 11.

[0118]

In the embodiment, image data corresponding to the page positions, at which images are to be displayed, of the sheets of electronic paper 10 and 11 are held on the sheets of electronic paper 10 and 11. Only remaining image data which does not correspond to the page positions of the sheets of electronic paper is output to the sheets of electronic paper 10 and 11 of the next pages or the host devices 21 and 22. However, the embodiment is not limited to the above configuration. Image data corresponding to the page position, at which an image is to be displayed, of the electronic paper 10 may be output to the sheets of electronic paper 10 and 11 of the next page or the host devices 21 and 22. In this case, the value of the position page field P2 is checked to decide the image data which cannot be completely displayed and which is returned to the host devices 21 and 22, so that the image data which cannot be completely displayed and which is returned to the host device 21 can be decided. In a re-display state of image data, the image data which cannot be completely displayed and which is returned to the host devices 21 and 22 can be displayed.

[0119]

Further, in the embodiment, additional information (page fields 44 or front/rear field P3) added to image data is preferably added as a header of the image data. When the additional information is added as the header, before all the image data are received, it can be decided whether or not transferring should be performed, and the memory of the control section 38 arranged in the sheets of electronic paper 10 and 11 to store page contents can be reduced.

[0120]

In the above embodiment, the display page field P1 and the position page field P2, or the display page field P1, the position page field P2, and the front/rear field P3 are added to image data. However, page settings (page positions of the sheets of electronic paper 10 which are held in the host device 20) are set and stored in the control sections 38 of the sheets of electronic paper 10 in advance depending on arrangements of serial connections of the sheets of electronic paper 10 held in the host device 20, so that the position page field P2 may not be added to the image data.

[0121]

More specifically, in the embodiment, in place of comparison between the position page field P2 and the display page field P1 (step 206 in Fig. 10 or step 404 in Fig. 15), the display page field P1 is compared with the page settings which are set in the sheets of electronic paper 10 in advance, so that an image based on image data corresponding to the display page field P1 is displayed on the electronic paper 10, the page setting of which coincides with the display page field P1. When the sheets of electronic paper 10 are removed from the host device 20, if the sheets of electronic paper 10 are not returned to the original page position, the pages of the sheets of electronic paper 10 are arranged at random with the sheets of electronic paper 10 held in the host device 20. However, as in the above embodiments, display on the sheets of electronic paper 10 can be controlled.

[0122]

[Effects of the Invention]

As described above, the present invention can provide effects in that page information expressing a page to be displayed in the plurality of thin display devices

held as a plurality of pages and page position information expressing a current page position of the image data by being updated for each page are added to image data by the host device. The image data is sequentially transmitted to the respective thin display devices and images are displayed when the page information and the page position information coincide with each other. Then, the page position information is updated, and sequentially transmitted to the thin display device of the sequential page or the host device thus making it possible to display a desired image on the thin display device. Accordingly, display control can be performed with a simple structure and simple communication.

[0123]

Further, the present invention can provide effects in that the page information is added to the image data by the host device by the page setting information being stored previously in each thin display device in place of the page position information, depending on a series connection between the thin display devices, sequentially transmitted to each o thin display device, and an image is displayed by each thin display device on the basis of image data in which the page information and the page setting information coincide with each other, and image data having page information added to is sequentially transmitted to the thin display device of the sequential page or the host device thus making it possible to display a desired image on the thin display device. Accordingly, display control can be performed with a simple structure and simple communication.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1]

Fig. 1 is a perspective view showing the appearance of electronic paper according to a first embodiment of the present invention.

[Fig. 2]

Fig. 2 is a diagram showing a state in which sheets of electronic paper are stacked on each other.

[Fig. 3]

Fig. 3 is a perspective view showing sheets of electronic paper and a host device for holding the sheets of electronic paper.

[Fig. 4]

Fig. 4 is a sectional view showing a holding state of the host device for holding one sheet of electronic paper.

[Fig. 5]

Fig. 5 is a sectional view showing a holding state of the host device for holding three sheets of electronic paper.

[Fig. 6]

Fig. 6 is a block diagram showing an electric configuration of electronic paper and a host device according to the first embodiment.

[Fig. 7]

Fig. 7 is a diagram for explaining communication of image data transmitted from the holding stand to the electronic paper.

[Fig. 8]

Fig. 8 is a diagram for explaining communication of image data transmitted from the host device according to the first embodiment to the electronic paper.

[Fig. 9]

Fig. 9 is a flow chart showing processes in communication performed in the host device according to the first embodiment.

[Fig. 10]

Fig. 10 is a flow chart showing processes in communication performed with the electronic paper according to the first embodiment.

[Fig. 11]

Fig. 11 is a block diagram showing an electric configuration of electronic paper and a host device according to a second embodiment.

[Fig. 12]

Fig. 12 is a diagram for explaining communication of image data transmitted from the host device according to the second embodiment to the electronic paper.

[Fig. 13]

Fig. 13 is a flow chart showing processes in communication performed in the host device according to the second embodiment.

[Fig. 14]

Fig. 14 is a flow chart showing processes in communication performed in the host device according to the second embodiment.

[Fig. 15]

Fig. 15 is a flow chart showing processes in communication performed with the electronic paper according to the second embodiment.

[Description of the Reference Numerals]

11, 12: ELECTRONIC PAPER

12: DISPLAY REGION

14: IMAGE

16: OUTER FRAME

18, 22: CONNECTION SECTION

20, 21: HOST DEVICE

24, 25: CONTROL SECTION

28: OPERATION SECTION

30: STORAGE SECTION

32, 34, 36: COMMUNICATION INTERFACE (I/F)

38: CONTROL SECTION

40, 40A, 40B: DISPLAY SECTION

42: PAGE DATA

44: PAGE FIELD

P1: DISPLAY PAGE FIELD

P2: POSITION PAGE FIELD

P3: FRONT AND REAR FIELD

[DOCUMENT NAME] ABSTRACT OF DISCLOSURE

[SUMMARY]

[OBJECT]

To provide a thin display file that is able to perform display control with a simple structure and simple communication.

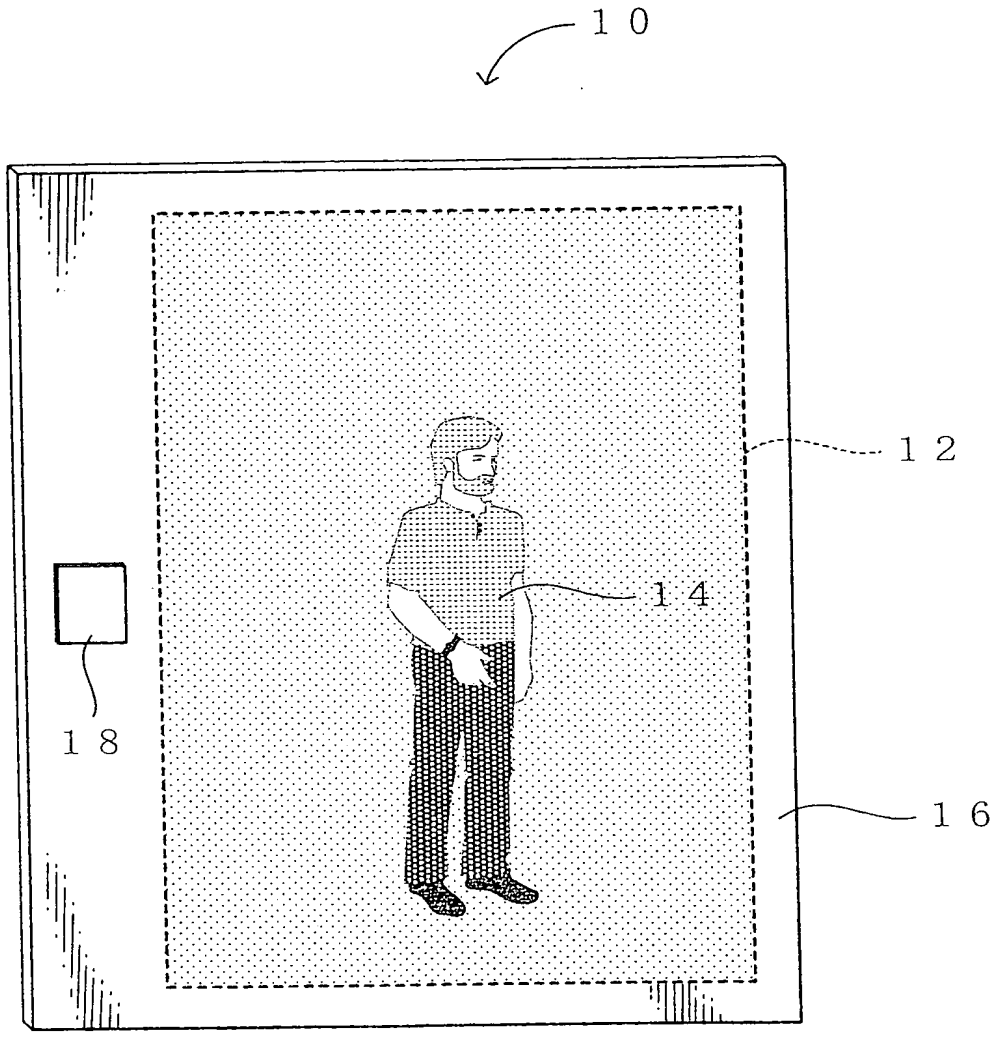
[MEANS FOR SOLUTION]

The host device 20 adds two page fields (display page field P1 expresses the number of pages of electronic paper 10 to be displayed, and position page field P2 expresses a current page position of the electronic paper 10 and is incremented on each sheet of electronic paper 10) 44 to page data 42 serving as image data, and the image data is output to sheets of electronic paper. In each sheets, when the two page fields 44 of the image data having the two page fields 44 added thereto coincide with each other in comparison therebetween, an image based on the image data is displayed in a display region. When the two page fields are different from each other, the position page field is incremented by one, and the position page field is transmitted to the next electronic paper.

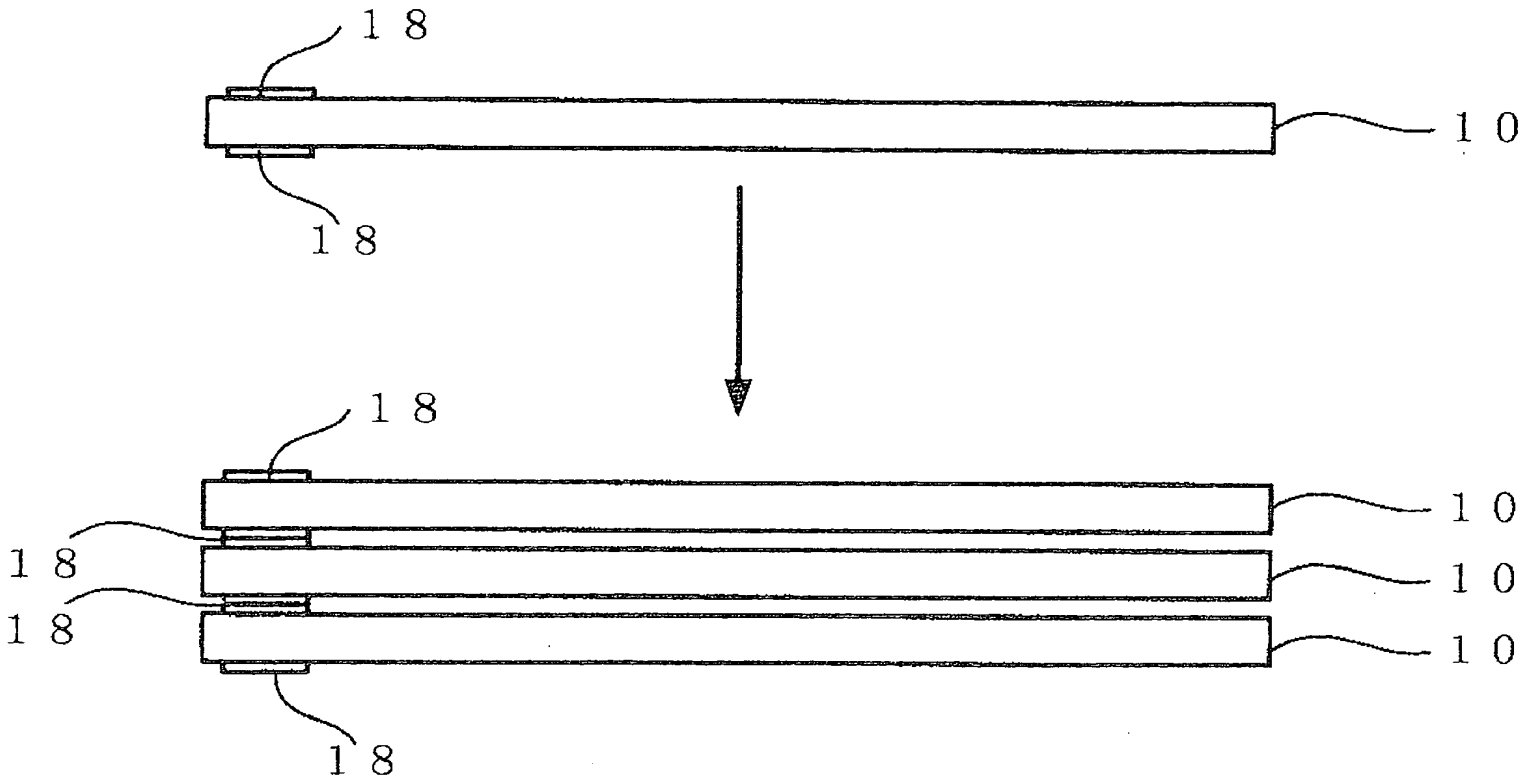
[SELECTED FIGURE] Fig. 8

[DOCUMENT NAME] DRAWINGS

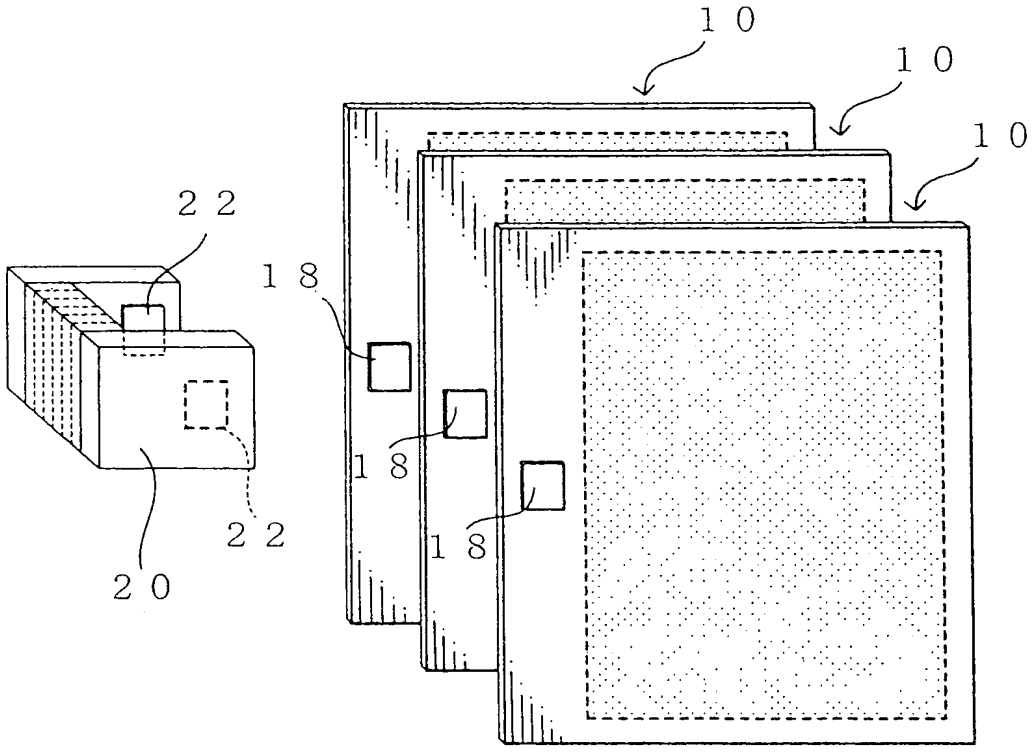
[Fig. 1]



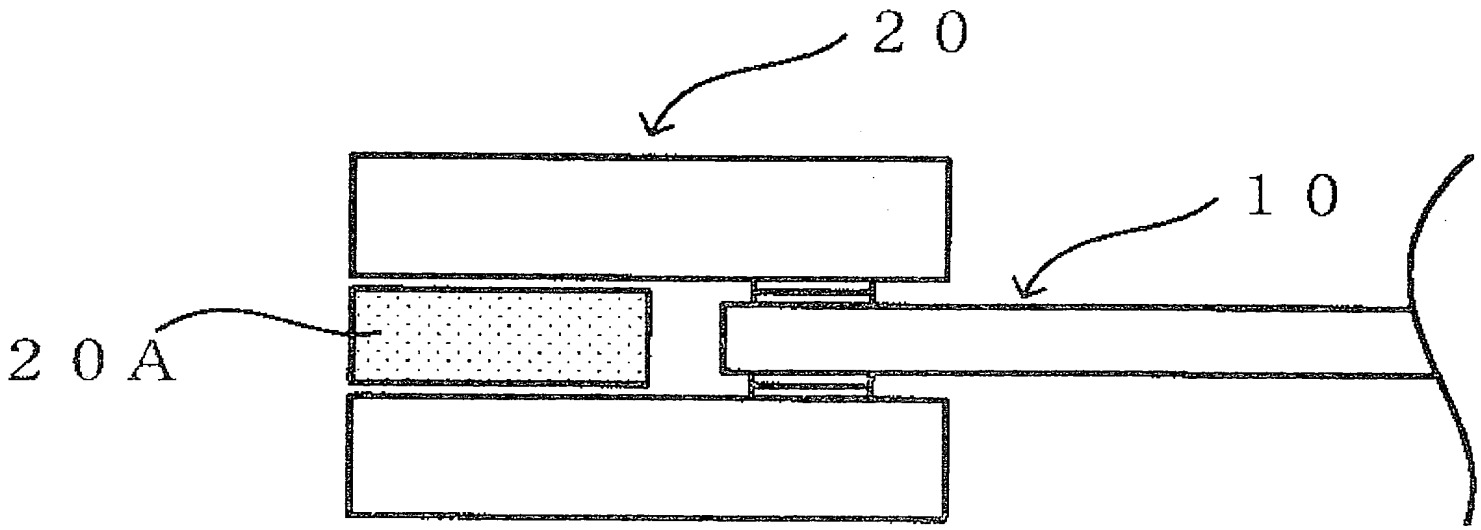
[Fig. 2]



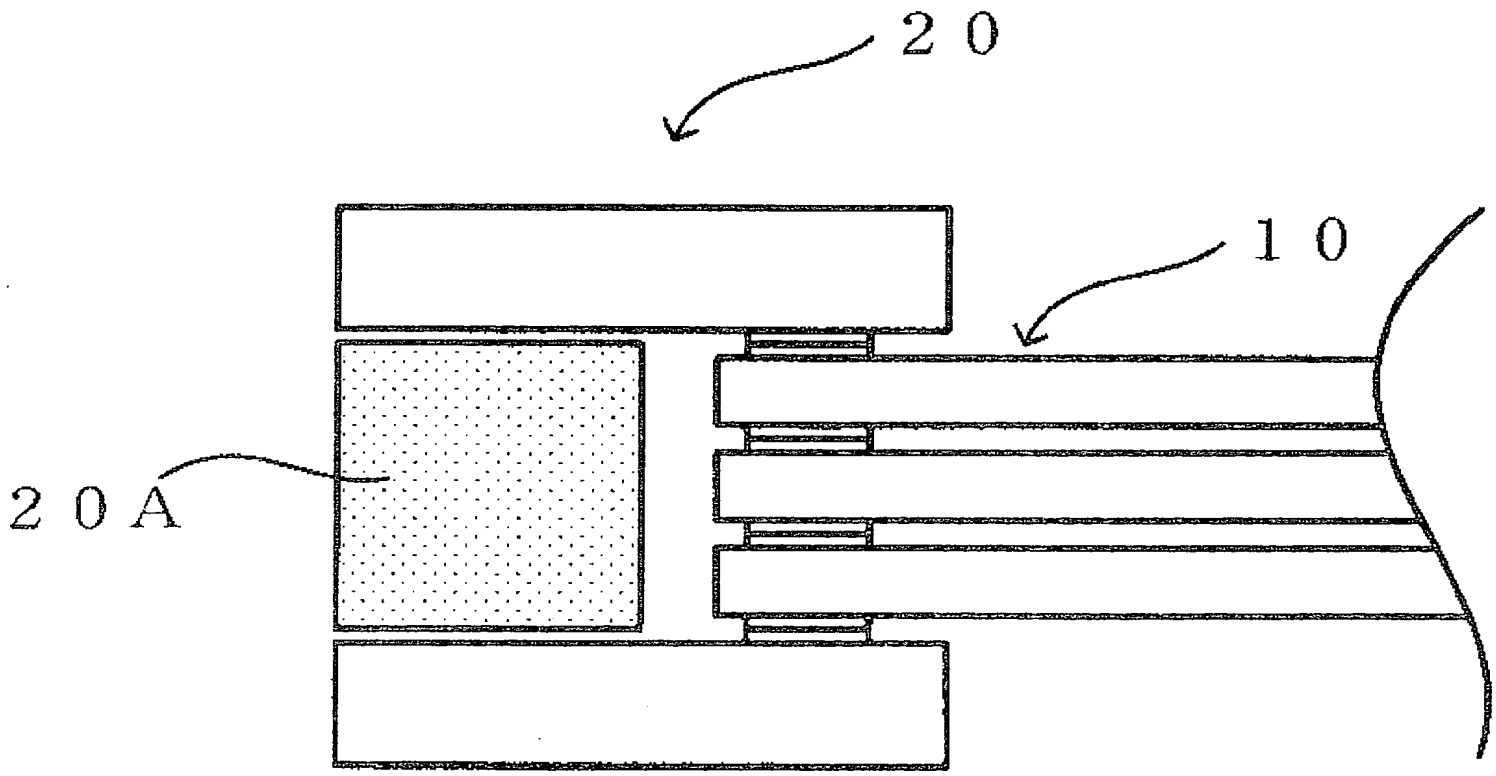
[Fig. 3]



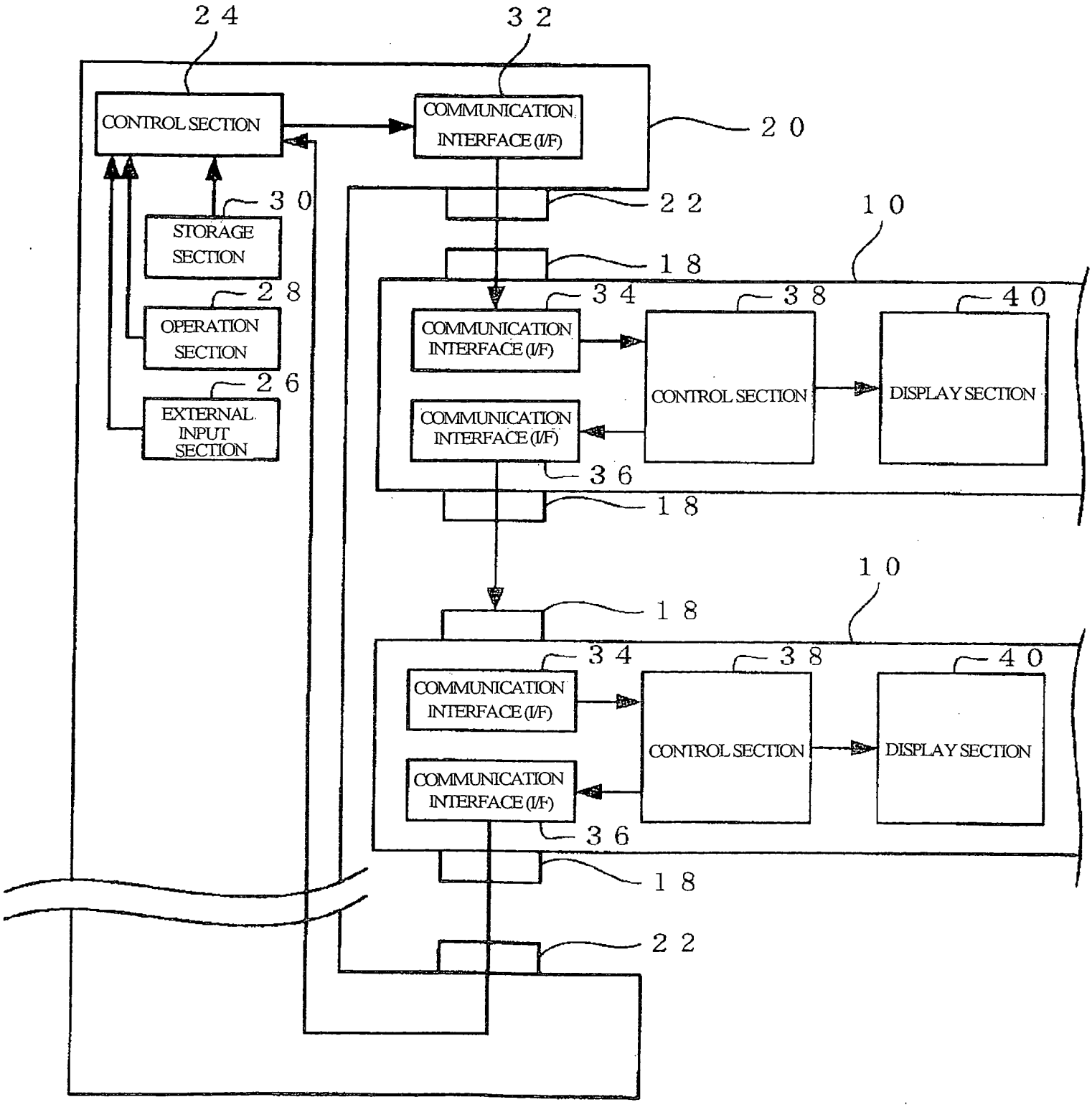
[Fig. 4]



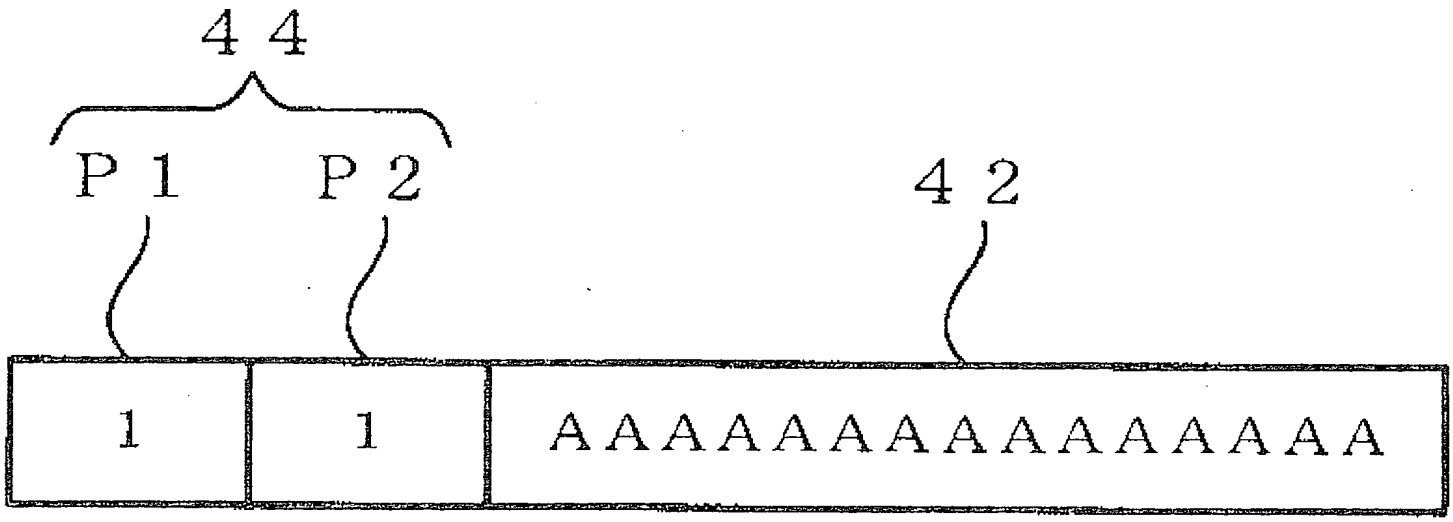
[Fig. 5]



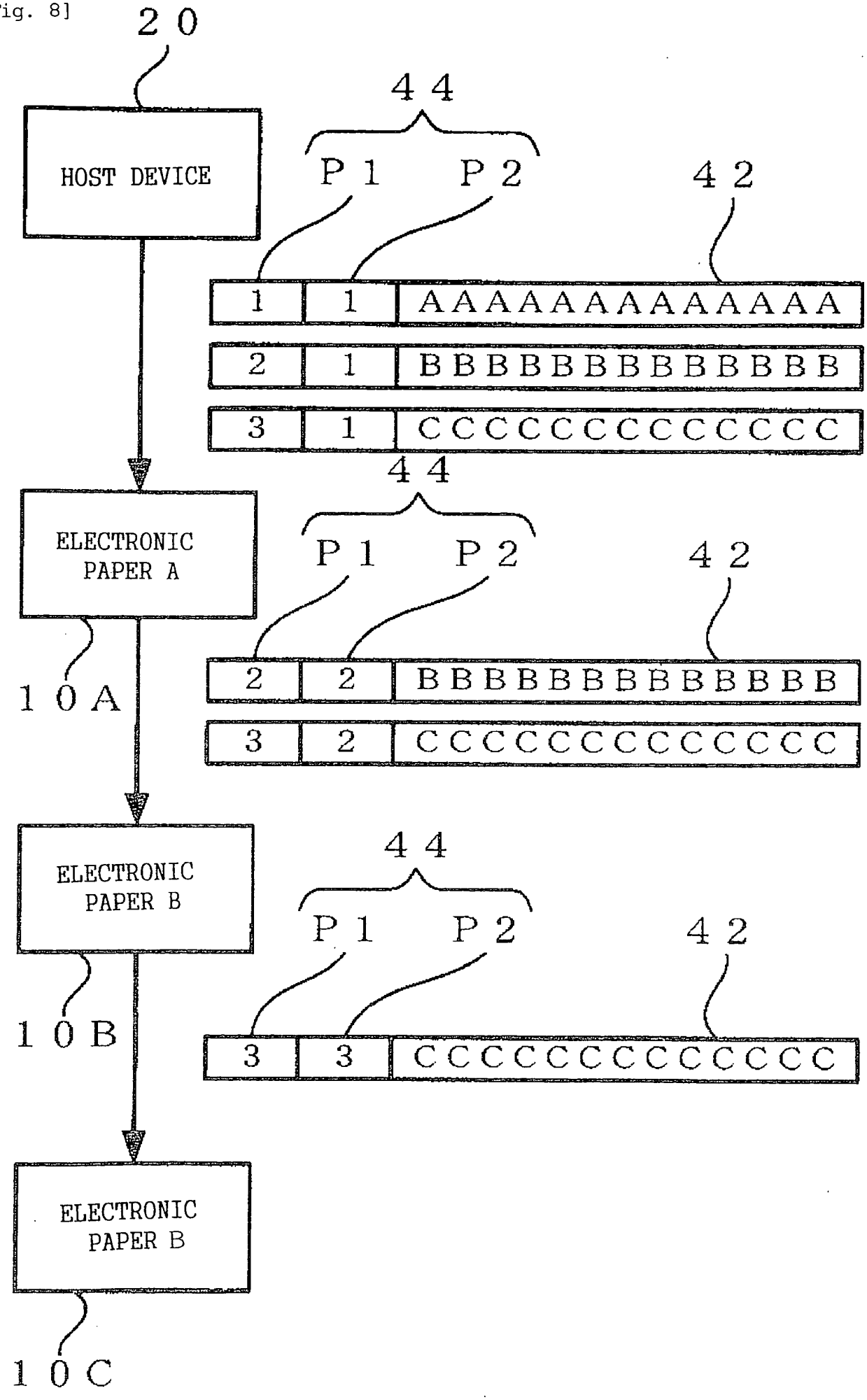
[Fig. 6]


24
32
CONTROL SECTION
COMMUNICATION INTERFACE (I/F)
20
30
STORAGE SECTION
22
10
18
28
OPERATION SECTION
34
38
40
COMMUNICATION INTERFACE (I/F)
CONTROL SECTION
DISPLAY SECTION
26
EXTERNAL INPUT SECTION
COMMUNICATION INTERFACE (I/F)
36
18
10
18
34
38
40
COMMUNICATION INTERFACE (I/F)
CONTROL SECTION
DISPLAY SECTION
COMMUNICATION INTERFACE (I/F)
36
18
22

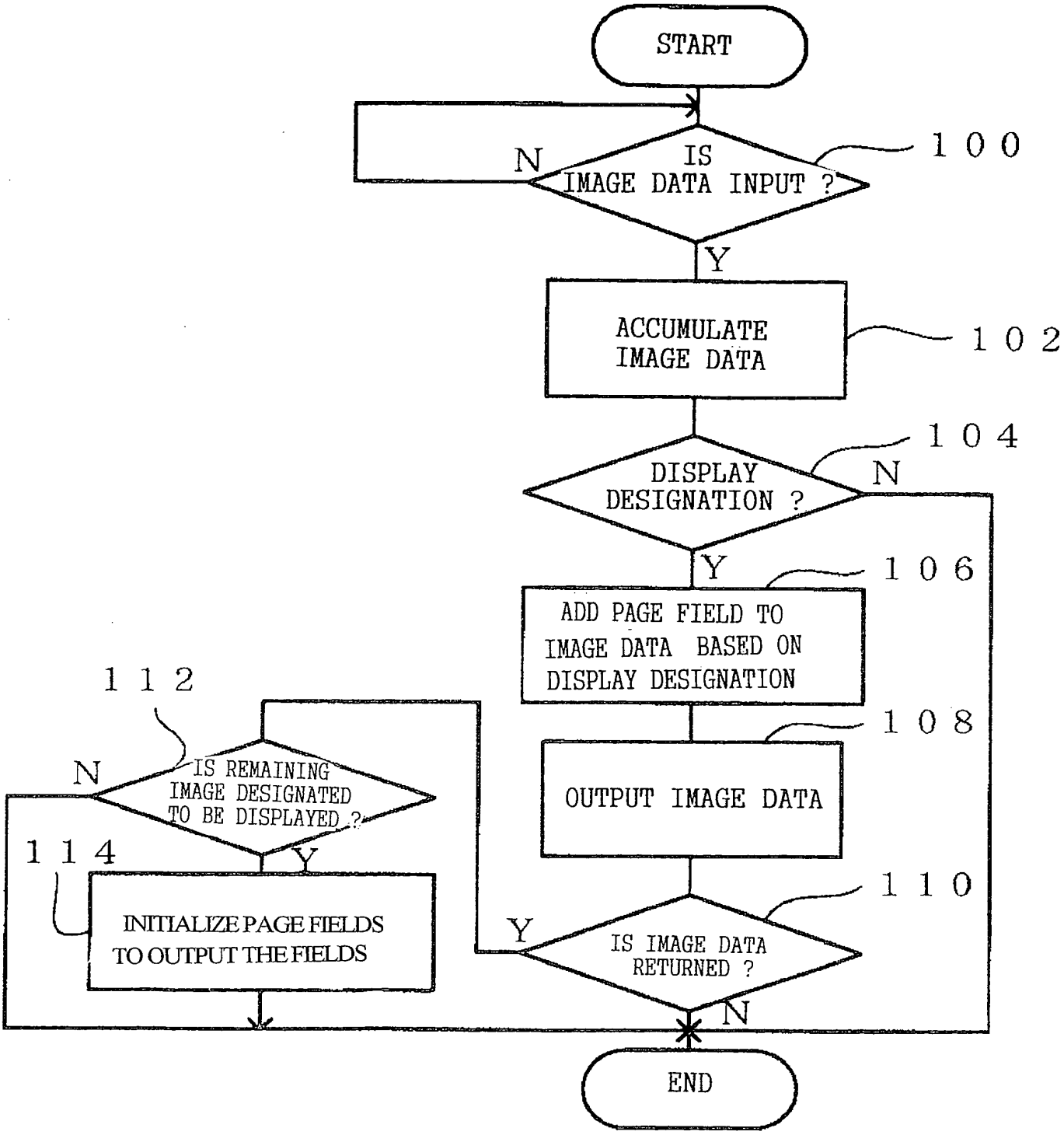
[Fig. 7]



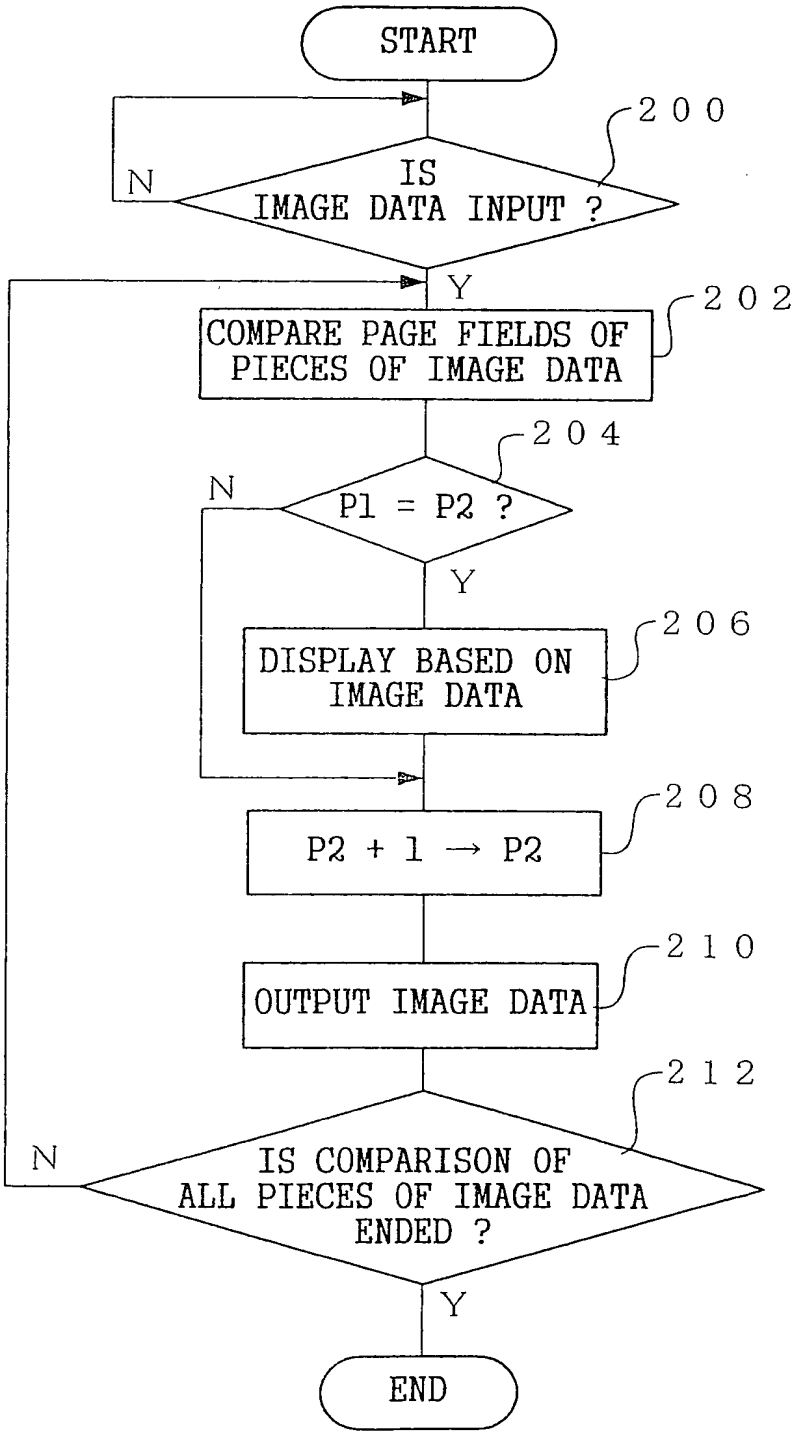
[Fig. 8]


20
HOST DEVICE
44
P1
P2
42
1
1
AAAAAAAAAAAAAAA
2
1
BBBBBBBBBBBBBBB
3
1
CCCCCCCCCCCCCCC
ELECTRONIC PAPER A
10A
2
2
BBBBBBBBBBBBBBB
3
2
CCCCCCCCCCCCCCC
ELECTRONIC PAPER B
10B
3
3
CCCCCCCCCCCCCCC
ELECTRONIC PAPER B
10C

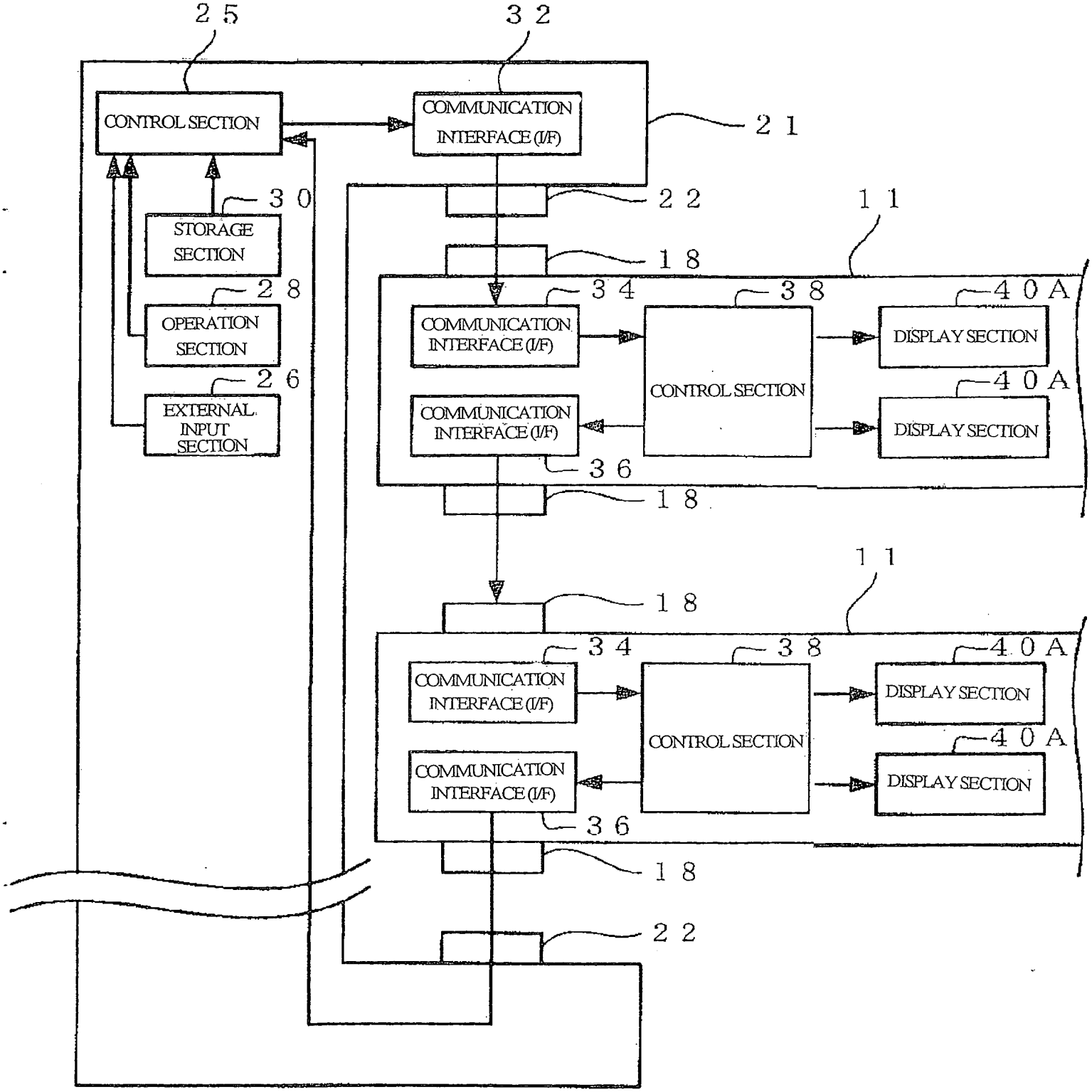
[Fig. 9]


START
IS IMAGE DATA INPUT ?
N
Y
100
ACCUMULATE IMAGE DATA
102
DISPLAY DESIGNATION ?
N
Y
104
ADD PAGE FIELD TO IMAGE DATA BASED ON DISPLAY DESIGNATION
106
OUTPUT IMAGE DATA
108
IS IMAGE DATA RETURNED ?
Y
N
110
IS REMAINING IMAGE DESIGNATED TO BE DISPLAYED ?
N
Y
112
INITIALIZE PAGE FIELDS TO OUTPUT THE FIELDS
114
END

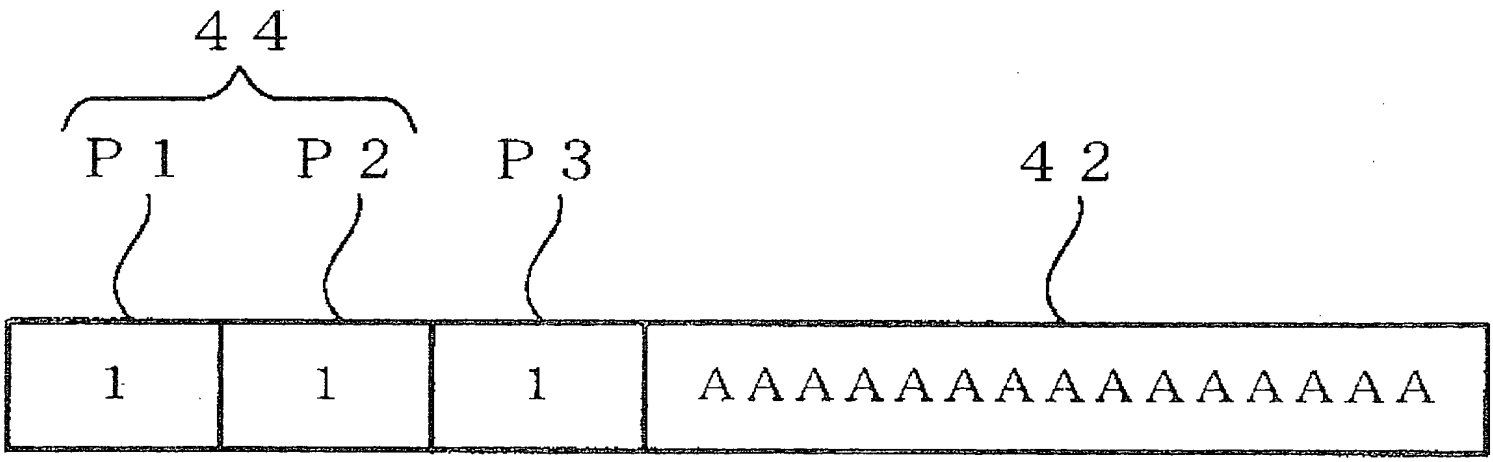
[Fig. 10]


START
200
IS IMAGE DATA INPUT ?
N
Y
202
COMPARE PAGE FIELDS OF PIECES OF IMAGE DATA
204
P1 = P2 ?
N
Y
206
DISPLAY BASED ON IMAGE DATA
208
P2 + 1 → P2
210
OUTPUT IMAGE DATA
212
IS COMPARISON OF ALL PIECES OF IMAGE DATA ENDED ?
N
Y
END

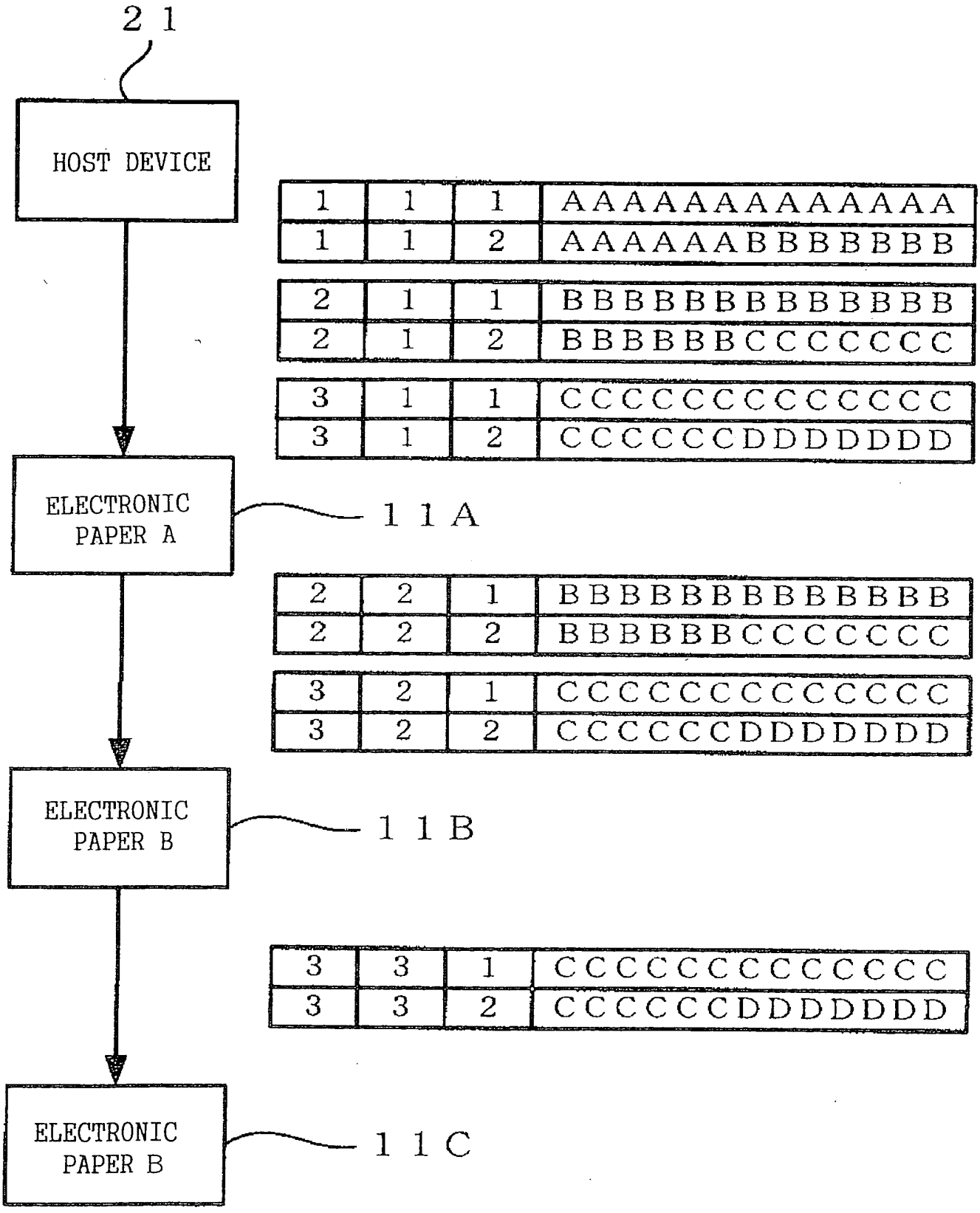
[Fig. 11]


25
32
CONTROL SECTION
COMMUNICATION INTERFACE (I/F)
21
22
11
18
30
STORAGE SECTION
28
OPERATION SECTION
26
EXTERNAL INPUT SECTION
34
38
40A
COMMUNICATION INTERFACE (I/F)
CONTROL SECTION
DISPLAY SECTION
40A
COMMUNICATION INTERFACE (I/F)
DISPLAY SECTION
36
18
11
18
34
38
40A
COMMUNICATION INTERFACE (I/F)
CONTROL SECTION
DISPLAY SECTION
40A
COMMUNICATION INTERFACE (I/F)
DISPLAY SECTION
36
18
22

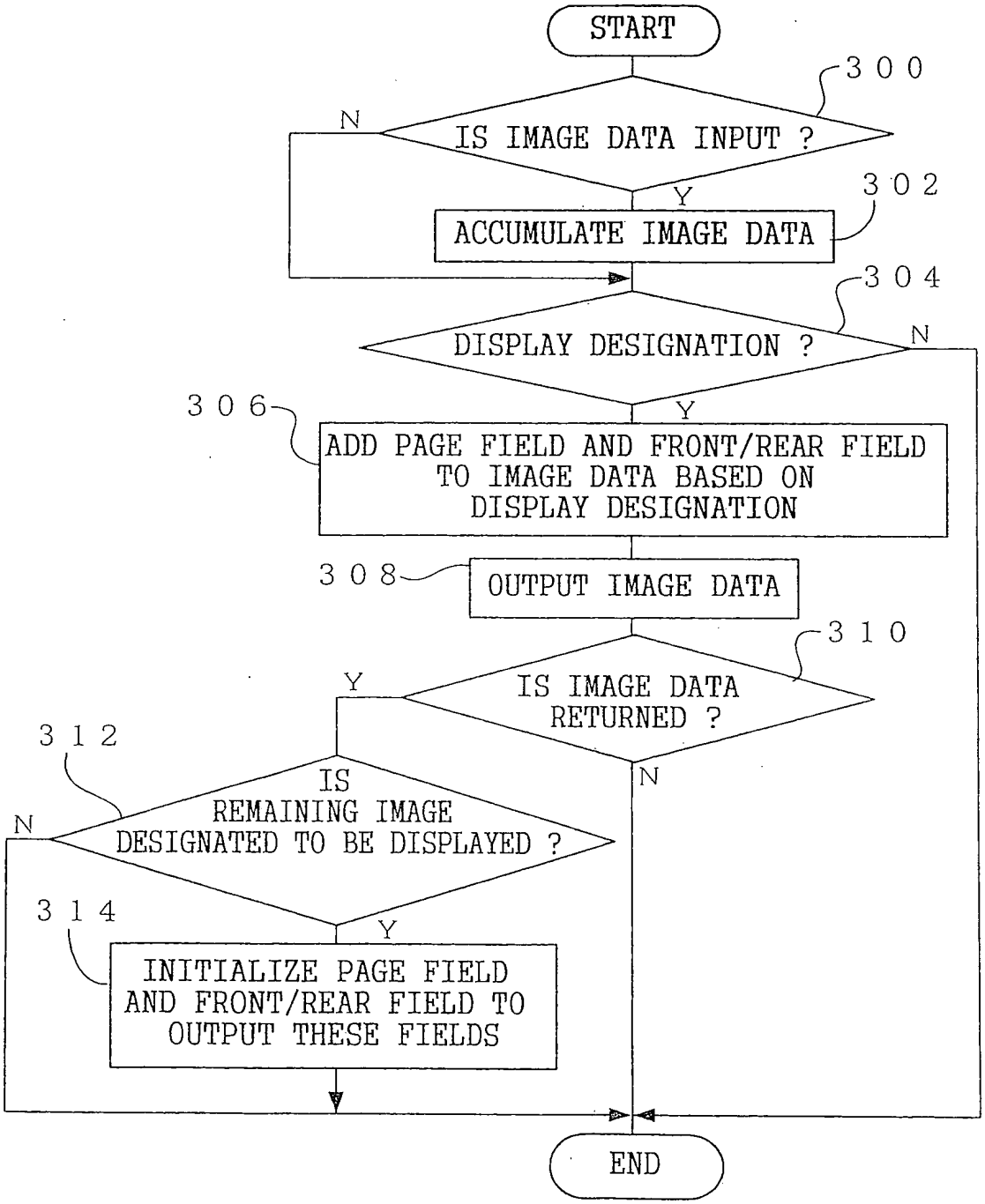
[Fig. 12]



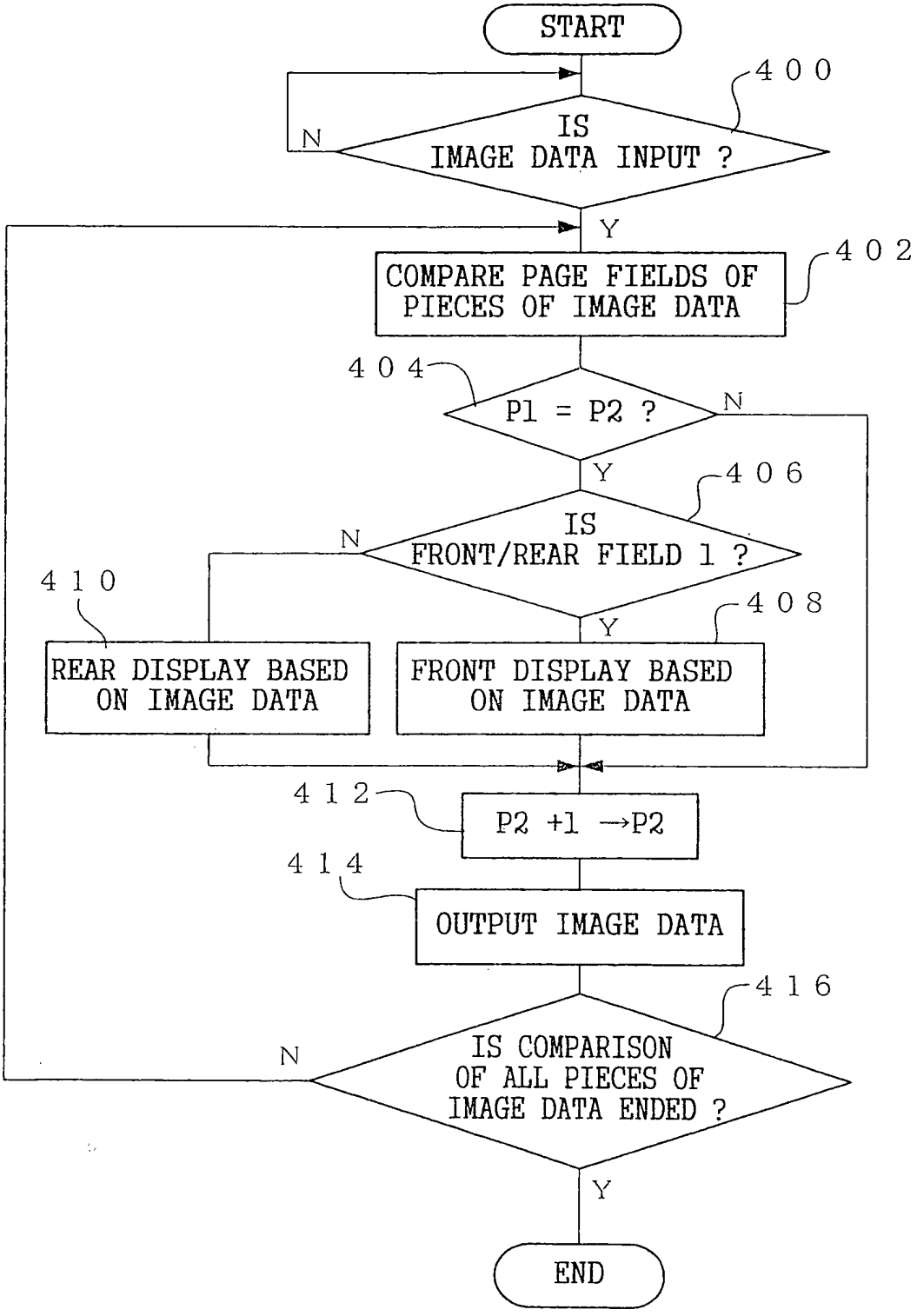
[Fig. 13]


21
HOST DEVICE
1 1 1 AAAAAAAAAAAAAAA
1 1 2 AAAAAAABBBBBBBB
2 1 1 BBBBBBBBBBBBBBB
2 1 2 BBBBBBBCCCCCCCC
3 1 1 CCCCCCCCCCCCCCC
3 1 2 CCCCCCCDDDDDDDD
ELECTRONIC PAPER A
11A
2 2 1 BBBBBBBBBBBBBBB
2 2 2 BBBBBBBCCCCCCCC
3 2 1 CCCCCCCCCCCCCCC
3 2 2 CCCCCCCDDDDDDDD
ELECTRONIC PAPER B
11B
3 3 1 CCCCCCCCCCCCCCC
3 3 2 CCCCCCCDDDDDDDD
ELECTRONIC PAPER B
11C

[Fig. 14]


START
300
IS IMAGE DATA INPUT ?
N
Y
302
ACCUMULATE IMAGE DATA
304
DISPLAY DESIGNATION ?
N
Y
306
ADD PAGE FIELD AND FRONT/REAR FIELD TO IMAGE DATA BASED ON DISPLAY DESIGNATION
308
OUTPUT IMAGE DATA
310
IS IMAGE DATA RETURNED ?
Y
N
312
IS REMAINING IMAGE DESIGNATED TO BE DISPLAYED ?
N
Y
314
INITIALIZE PAGE FIELD AND FRONT/REAR FIELD TO OUTPUT THESE FIELDS
END

[Fig. 15]


START
400
IS IMAGE DATA INPUT ?
N
Y
402
COMPARE PAGE FIELDS OF PIECES OF IMAGE DATA
404
P1 = P2 ?
N
Y
406
IS FRONT/REAR FIELD 1 ?
N
Y
410
REAR DISPLAY BASED ON IMAGE DATA
408
FRONT DISPLAY BASED ON IMAGE DATA
412
P2 +1 →P2
414
OUTPUT IMAGE DATA
416
IS COMPARISON OF ALL PIECES OF IMAGE DATA ENDED ?
N
Y
END